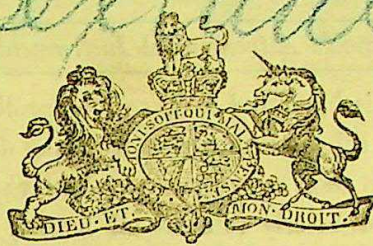


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JAN 1731



A.D. 1731 . . . . . N<sup>o</sup> 528.

Astronomical and Nautical Instrument.

BUCKNALL'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, WILLIAM BUCKNALL, of the Parish of Saint Mary-le-Bow, in the County of Middlesex, Gentleman, send greeting.

WHEREAS our Sovereigne Lord George the Second, by the grace of God  
 5 of Great Britain, France, and Ireland King, Defender of the Faith, &c., hath  
 by His Letters Patents under His Great Seal of Great Britain, bearing date  
 at Westminster, the Thirtieth day of Aprill, in the fourth year of His raigne,  
 granted unto me, the said William Bucknall, licence, full power, sole  
 priviledge and authority, that I, the said William Bucknall, my executors,  
 10 administrators, and assignes, and every of them, by myselfe and them-  
 selves, or by my or their deputy or deputies, servants or agents, or such  
 others as I, the said William Bucknall, my executors, administrators, and  
 assignes, should agree with (and no others) from time to time, to exercise, work,  
 use, and enjoy my new invented "MATHEMATICALL MACHINE IN TWO PARTS, FOR  
 15 THE IMPROVEMENT OF ASTRONOMY AND NAVIGATION," within England, Wales, and  
 the Towne of Berwick-upon-Tweed, to have, hold, exercise, and enjoy the  
 said licence, powers, priviledges, and advantages unto me, the said William  
 Bucknall, my executors, administrators, & assignes, for and during, and  
 unto the full end and term of fourteen years from the date of the said Letters  
 20 Patents, fully to be compleat and ended; in which said Letters Patents there  
 is a proviso in the words following (viz<sup>t</sup>):—Provided also that if the said  
 William Bucknall doe not particularly describe and ascertain the nature of his  
 said Invention, and in what manner the same is to be performed, by an instru-

etc

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*Bucknall's Astronomical Instrument, &c.*

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ment or writing under his hand and seal, to be inrolled in our High Court of Chancery within two calendar moneths from the date of these our Letters Patents, that then and in such case these our Letters Patents shall forthwith cease, determine, and be utterly void to all intents and purposes, anything herein contained to the contrary thereof in anywise notwithstanding, as by 5 the said recited Letters Patents (relation being thereunto had) more fully and at large it doth and may appear.

**NOW KNOW YEE**, that I, the said William Bucknall, in obedience to His Majestie's Letters Patents have described and ascertained, and by these Presents doe describe and ascertain, the nature of my said Invention or 10 new invented mathematicall machine for the improvement of astronomy or navigation to consist of two parts.

A Description of a Mathematicall Instrument or Machine in two Parts, for the Improvement of Astronomy and Navigation.—The first part of this machine consists of four rings or circles made of brass, and which may be 15 made of any other proper metall, or of wood, and of two axis or pins passing through the center of the whole, and when put together represent an armillary sphere. The first or outermost ring or circle moves in a groove cut in the next or inner circle, which inner circle is called the meridian circle, and on this outmost ring or circle is fixed a small ring or handle to hold the instru- 20 ment by when used, and has a pointer fixed thereon to shew the latitude of the place which is marked on the meridian circle. The second or next ring or circle is called the meridian circle, and on two quarters thereof are graduated twice ninety degrees with other subdivisions, which serve to shew the latitude of the place on each side the equater. The third or next ring or circle is 25 called the equater circle, and is fixed to the meridian by two small pins on which it turns on an axis, and thereby when used can be sett at right angles with the meridian circle, and on this equater are graduated the twenty-four hours and three hundred and sixty degrees, with other subdivisions. The fourth or innermost ring or circle is called the ecliptick circle, and moves on 30 the pin or axis hereafter described; and on this circle are ingraved the days of each moneth, the twelve signs of the zodiack, and each signe is divided into thirty degrees, and other subdivisions, and on the center of its axis is fixed a sight and pin, which represents the axis of the ecliptick. The axis is a brass or other mettall pin which passes through the center of the ecliptick circle, 35 and serves to represent the two poles of the ecliptick; and this circle, as well as the axis, may be taken out and put in, as occasion requires. In the nadir of the first or outmost circle is fixed a compass box, and needle touched by the loadstone, which shews the variaçon of the compass by day and night. The



*Bucknall's Astronomical Instrument, &c.*

- method of using the instrument is as follows :—Open the equator ring and sett it at right angles with the meridian ring ; then move the ecliptick on the pole or axis of the ecliptick, till the middle of the equator ring cutts the degree of that signe of the zodiack the sun is in at that time of the year ; then
- 5 hold the instrument by the ring or handle, and move the first or outer circle upon the meridian circle till the shadow from the end of the sight pin, which is the true pole of the ecliptick, falls on the ecliptick circle or line ; this done, the shadow from the axis passing through the ecliptick sign shews the hour of the day on the ecliptick, and the pointer of the meridian circle at the same
- 10 time shews the latitude of the place you are in, and the needle in the compass box also at that time shews the variaçon from the true poles of the world. Then take the sun's place of departure and compare it to the sun's place shewn on the ecliptick in this instrument, and the number of degrees and minutes between them is the difference of meridians. The same thing is answered by
- 15 the shadow of the moon, the instrument being placed to that shadow in the manner as is before directed to the sun ; and by comparing the moon's apparent place at the time of this observation with the apparent place thereof at the time of departure, the number of degrees and minutes is the difference of meridians, all which, by inspecçon, are seen on the circle in the ecliptick.
- 20 In case the moon gives little or no shade, and you would know the time of night by a fixed starr, this must be done by an eye-glass and object-glass fixed att a proper focus on the axis of the poles, with cross-hairs in the focus of the eye-glass, so that by looking through the glass, and by moving the instrument as before directed, the starr cutts the cross-hairs, the pointer from the
- 25 center of the axis gives the angle att the pole on the equator, whereby the hour of the night is known, so that by this instrument the latitude of any place, the hour of the day and night, the variaçon of the compass, and difference of the meridians by the sun and moon, may be known in any part of the world by one operation and inspection only.
- 30 The other, or second part of this machine, is only a chair or stool whereon the observer is to stand or sit at the time of observation steady, although the ship be moving under sail. This stool is made of two strong peices of board or plank, about two inches thick, and eighteen or twenty inches square, framed together by two strong peices of wood, att sixteen or seven-
- 35 teen inches distance from each other in the center of the upper board. On the under side is fixed a box of steel, or other hard metall, turned hollow in a concave form, with the hollow downwards ; and to that box is fitted a pin of a conick form, of steel or hard metall, placed on a strong plank about four or five inches broad, which is to be put across the stool



*Bucknall's Astronomical Instrument, &c.*

in the vacancy between the two boards. The concave sockett is to rest on the conick pin, and the plank itselfe is to rest on two stools or chairs placed on the ship; and from the fower corners of the lower board is to go four cords or lines, which are to unite in the center of the lower board underneath, to which lines in their meeting in the centre is to be hung a lead, or other 5 weight, in proportion to the weight of the chair and of the observer; and the chair being thus fixed, and the observer placed thereon, let the ship move as it pleases in case it be not violent, the stool still rolling on the conick pin is, by the weight underneath, kept always in a steady horizontall position.

In witness whereof, I hereunto sett my hand and seal, the Eighteenth 10 day of May, in the fourth year of His said Majestie's raigne, annoq, Dñi One thousand seven hundred and thirty-one.

W<sup>M</sup> BUCKNALL.

Signed, sealed, and delivered (being  
first legally stamped) in presence  
of

15

THO. DUTTON.

W<sup>M</sup> DAY.

ELDE. ET MEMORANDUM, quod decimo octavo die Maij, anno suprascripti prefatus, Willielmus Bucknall venit coram dco Domino Rege in Cancellaria, 20 sua et recognovit Scripti predicti, ac omnia et singula in eodem contenti et spificati in forma supradicti. Neenon Scripti predicti impresi fuit secundum tenorem Statuti facti, anno Regni Regis Gulielmi et Regine Marie, &c. sexto.

Irri xvij<sup>o</sup> die Junij A<sup>o</sup> rñi R<sup>s</sup> Geo. Secundi quinto, anno D. 1731.

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,  
Printers to the Queen's most Excellent Majesty. 1856.